3156

NATIONAL BUREAU OF STANDARDS REPORT

NBS Project
2300

March 11, 1954

NBS Report
3156

Part 2

Construction Details

for

XIII Modification

of

AN/AVQ-2A Aircraft Searchlight

by

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J. M. Lane

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J. M. Lane

Naval Aircraft Lighting Group
Photometry and Colorimetry Section
National Bureau of Standards
Washington, D. C.

Sponsored by

Bureau of Aeronautics, NE-5H
Department of the Navy
Washington, D. C.

NBS

U. S. DEPARTMENT OF COMMERCE
NATIONAL BUREAU OF STANDARDS

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Approved for public release by the Director of the National Institute of Standards and Technology (NIST) on October 9, 2015

Construction Details
for
NBS Modification
of
AN/AVQ-2A Aircraft Searchlight

A modification kit for the AN/AVQ-2A aircraft searchlight, incorporating a number of changes in the searchlight, principally in connection with the means for automatic maintenance of focus, was developed by the Naval Aircraft Lighting Group at the National Bureau of Standards in the Fall of 1951. A general description of this kit together with instructions for installation was contained in NBS Report 1354, "Instruction Book for Modification of the AVQ-2A Aircraft Searchlight, (Revised October, 1952)".

The purpose of the present report is to provide detailed information as to the construction of the various components of the kit, to assist bidders or contractors proposing to supply this equipment to the Bureau of Aeronautics of the Department of the Navy.

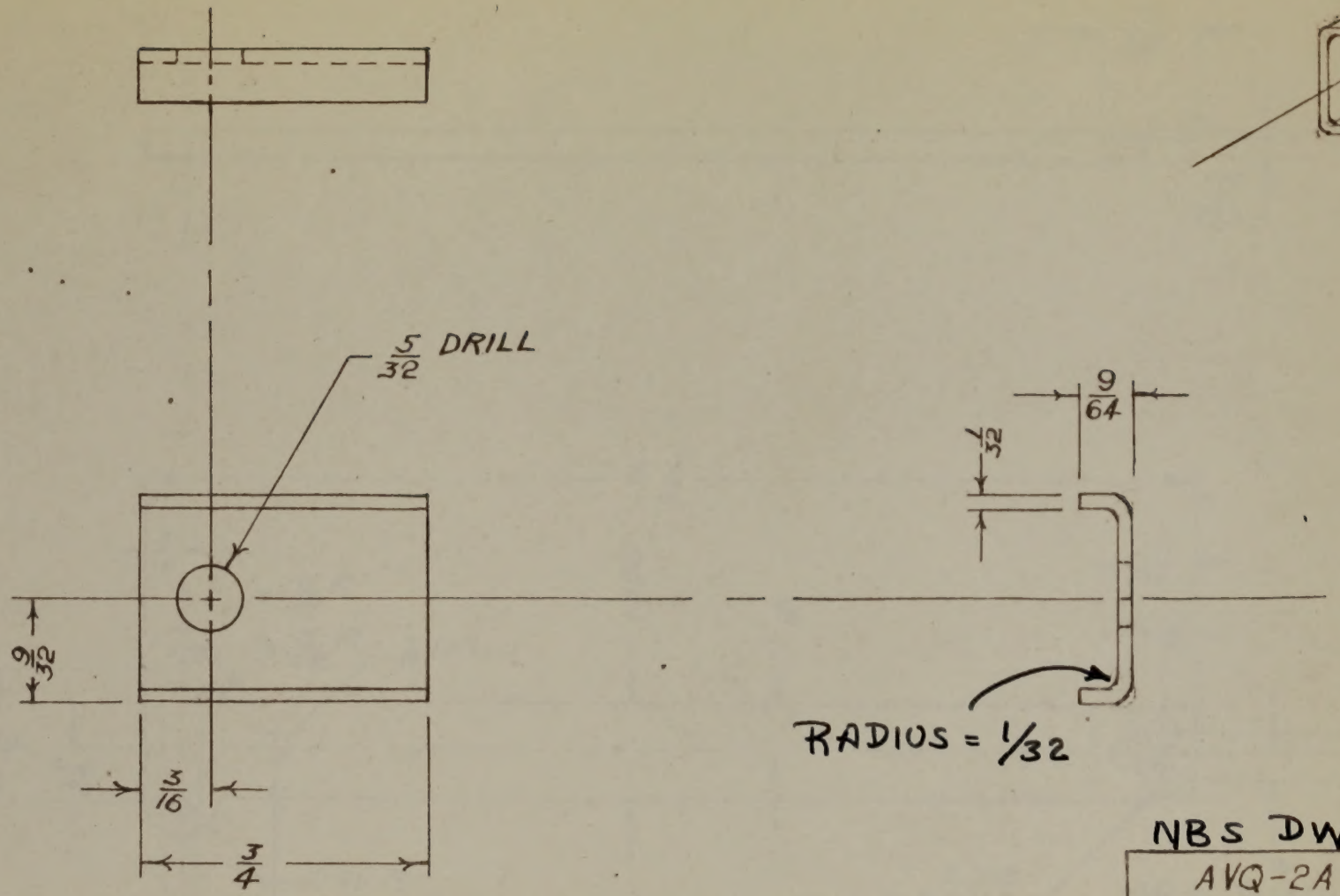
A list of the various components of the kit, to be supplied by the contractor, except where otherwise specified, together with detailed drawings as required, follows.

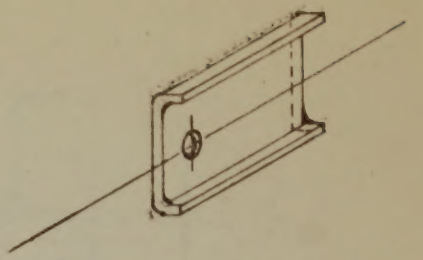
MODIFICATION KIT
AIRCRAFT SEARCHLIGHT AN/AVQ-2A

PART NO.	DESCRIPTION	QUANTITY
14	WASHER, machine, #6, for mounting brush (26) Material: brass	2
15	SLIDER STOP (see drawing #3156-15) Material: stainless steel AISI Type 302	1
17	SLIDER (not supplied by contractor) (see drawing #3156-17)	
18	HOUSER, with three screws (see drawing #3156-18) Material: Houser; copper Screws; stainless steel AISI Type 302, two 8-32 x 3/8, one 8-32 x 5/8	1
22	OBTURATOR-PROBE (see drawing #3156-22) Material: cavity-free, electrolytic tough-pitch copper	1
23	WASHER, insulating (8 required, 8 spares) (see drawing #3156-23) Material: Lava, grade "B" M. Kirchberger & Co. Brooklyn, N.Y.	16
24	CLAMP, with screw and lock washer (see drawing #3156-24) Material: stainless steel AISI Type 302	8
28	BRUSH CONTACT (see drawing #3156-28) Material: phosphor bronze	1
29	SCREW, for mounting brush (26), 6-32x3/4, binding head Material: stainless steel, AISI Type 302	2
30	BUSHING, insulating, to separate brush (26) from frame (see drawing #3156-30,31) Material: Textolite	2
31	WASHER, insulating, for use with insulating bushing (30) (see drawing #3156-30,31) Material: Textolite	2
32	INSULATOR, to separate obturator-probe (22) from positive contact assembly (see drawing #3156-32) Material: clear Phlogopite mica	1

PART NO.	DESCRIPTION	QUANTITY
43	SCREW, for securing obturator-probe (22) to positive contact assembly, 10-32, flat head, two 1 3/4" long and two 2 1/4" long Material: stainless steel AISI Type 302	4
44	BUSHING, insulating, for screws (43), four required, two spares (see drawing #3156-44) Material: Lava, grade "A" M. Kirchberger & Co. Brooklyn, N.Y.	6
46A	SPACER AND INSULATOR, for positive drive and positive contact assembly, two required, two spares (see drawing #3156-46A) Material: Lava, grade "A" M. Kirchberger & Co. Brooklyn, N.Y.	4
46B	INSULATOR, negative assembly, two required, two spares (see drawing #3156-46B) Material: Lava, grade "A" M. Kirchberger & Co. Brooklyn, N.Y.	4
47	RELAY BOX, containing relays K59 & K63 (see Hartman Electrical Mfg. Co. drawing #A832, NBS drawing #3156-47)	1
56	SPRING, douser (see drawing #3156-56) Material: .059 steel music wire, cadmium plated	1
57	SCREW, binding head and lock washer for mounting brace (65), 1/4-20 x 5/8 Material: stainless steel AISI Type 302	2
65	BRACE, connects positive contact assembly to positive drive assembly (see drawing #3156-65) Material: brass, half-hard	1
K64	RELAY, contactor, Model A-754D, Hartman Elec. Mfg. Co., Mansfield, Ohio. (See Hartman Dwg. A-754D, NBS Dwg. 3156-K64)	1

ITEM NO.	DESCRIPTION	QUANTITY
45	SCREW, for mounting electronic-probe (37) to pedestal, countersunk assembly, 3/8-16, 2-1/2 inch, two 1 3/8" long and two 2 1/2" long Material: stainless steel AISI Type 302	4
46	PLATE, identifying, for system (42), User Required, two engraved (see drawing 27A256-46) Material: Acry. plastic Fig. R. Kirschbaum & Co. Drawing No.	6
46A	SCREW, Set (Socket), for positive drive of pedestal (see drawing 27A256-46A) Material: Iron, grade 1" R. Kirschbaum & Co. Drawing No.	4
46B	PLATE, identifying, for positive drive of pedestal, two required (see drawing 27A256-46B) Material: Acry. plastic Fig. R. Kirschbaum & Co. Drawing No.	4
47	SCREW, socket, cap, 1/4-20 x 1/2 (see drawing 27A256-47) Material: alloy steel, socket head	2
56	PANEL, display (see drawing 27A256-56) Material: .059 aged matte alum. anodize plated	1
57	SCREW, 6-32 thru head slot-washer for mounting Screws (58), 1/4-20 x 5/8 Material: stainless steel AISI Type 302	8
65	BRACE, connecting rotating cylinder assembly to pedestal (see drawing 27A256-65) Material: brass, half-hard	1
66	PLATE, protective, Model A-75LD Machine Mfg. Co., Rockville, Conn. (See Hartman Dwg. A-75LD, NBS Dwg. 31.56-K64)	1





NBS DWG. Nº 3156-15

AVQ-2A SEARCHLIGHT
NBS MODIFICATION
REF: NBS REPORT 1354

NATIONAL BUREAU OF STANDARDS
WASHINGTON 25, D. C.

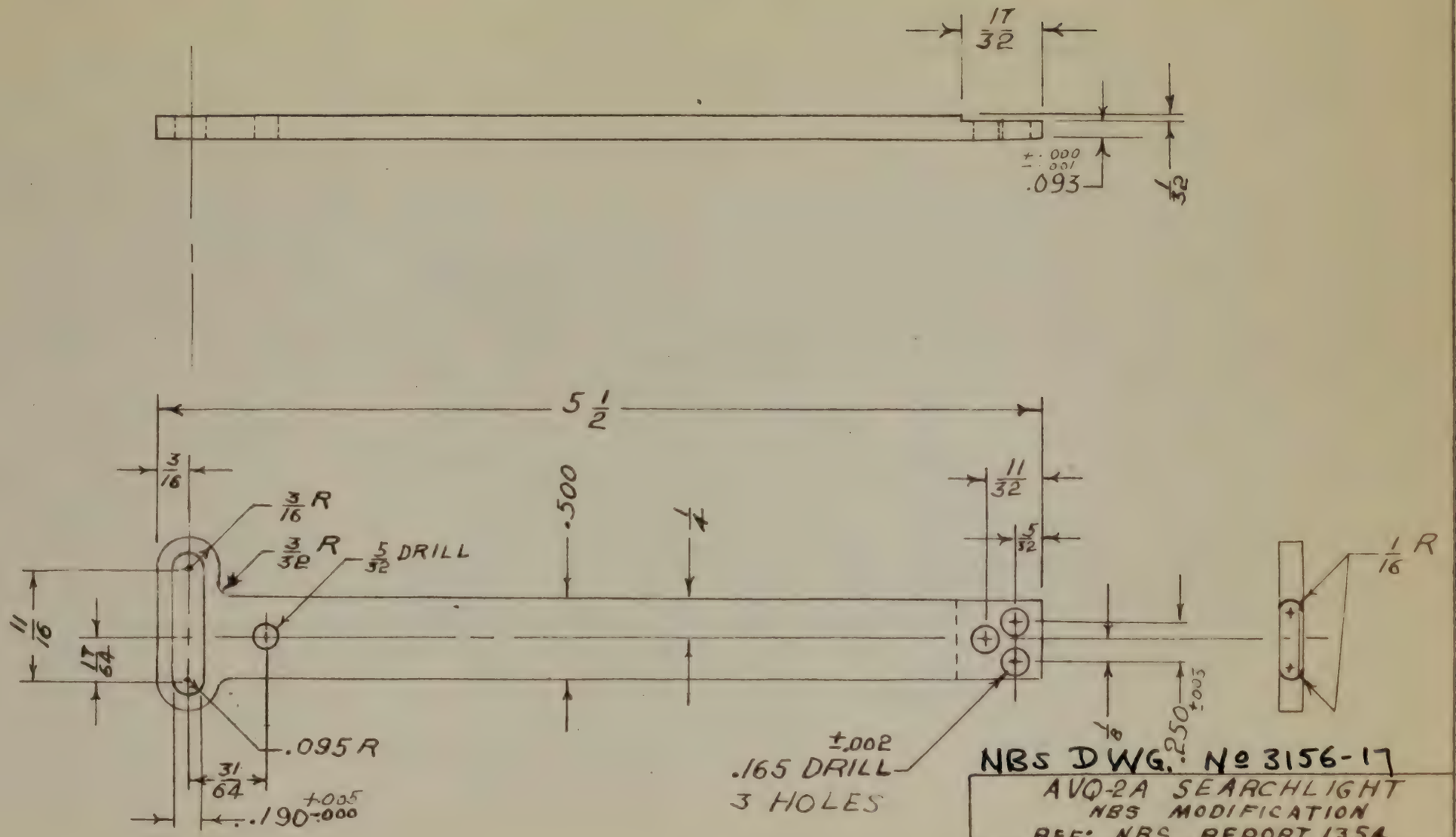
DRAFTSMAN	DATE	SCALE
W.F.M	8-8-52	2/1
DIV. SEC. 2 - 1	PART # 15 SLIDER STOP	

DIMENSIONS IN INCHES
TOLERANCES
(UNLESS OTHERWISE SPECIFIED)

DECIMALS	±.005
FRACTIONS	±.015
ANGLES	± ½°

AISI TYPE 302
MATERIAL: STAINLESS STEEL

NOT SUPPLIED BY CONTRACTOR.



NBS DWG. Nº 3156-17

AVQ-2A SEARCHLIGHT
NBS MODIFICATION
REF: NBS REPORT 1354

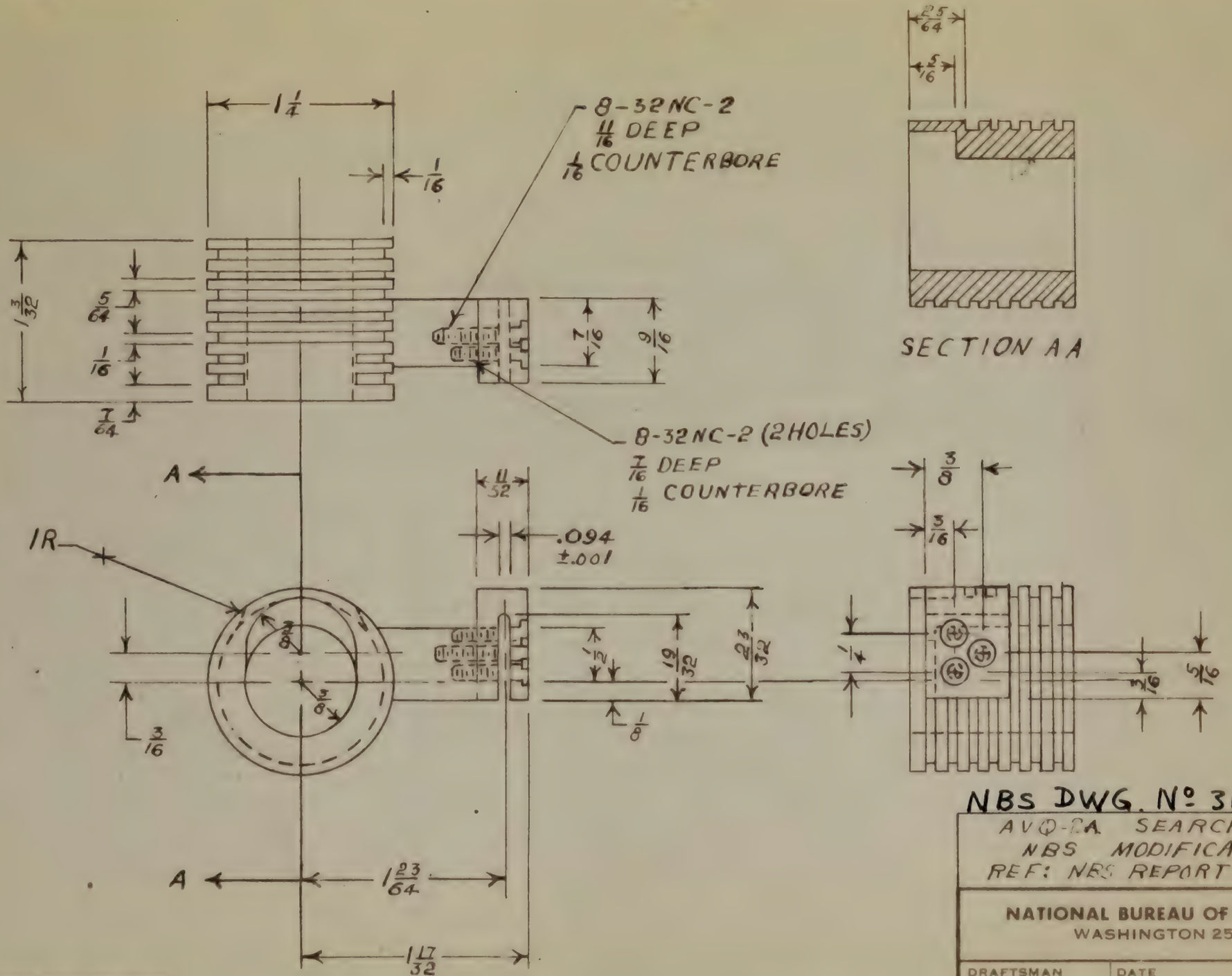
.125 THICK

DIMENSIONS IN INCHES TOLERANCES Unless Otherwise Specified	
DECIMALS	±.005
FRACTIONS	±.015
ANGLES	± ½°

GOVT. SPECT. ANQQ-S-75T
TRADE NAME: S-SLS TY. 347
MATERIAL: CORR. RES. STEEL

NATIONAL BUREAU OF STANDARDS
WASHINGTON 25. D C

DRAFTSMAN	DATE	SCALE
W.F.M.	8-12-52	1/1
DIV SEC	PART # 17	
2 — 1	SLIDER	



SECTION AA

NBS DWG. Nº 3156-18

AVCO-CA SEARCHLIGHT
NBS MODIFICATION
REF: NBS REPORT 1354

NATIONAL BUREAU OF STANDARDS
WASHINGTON 25. D. C.

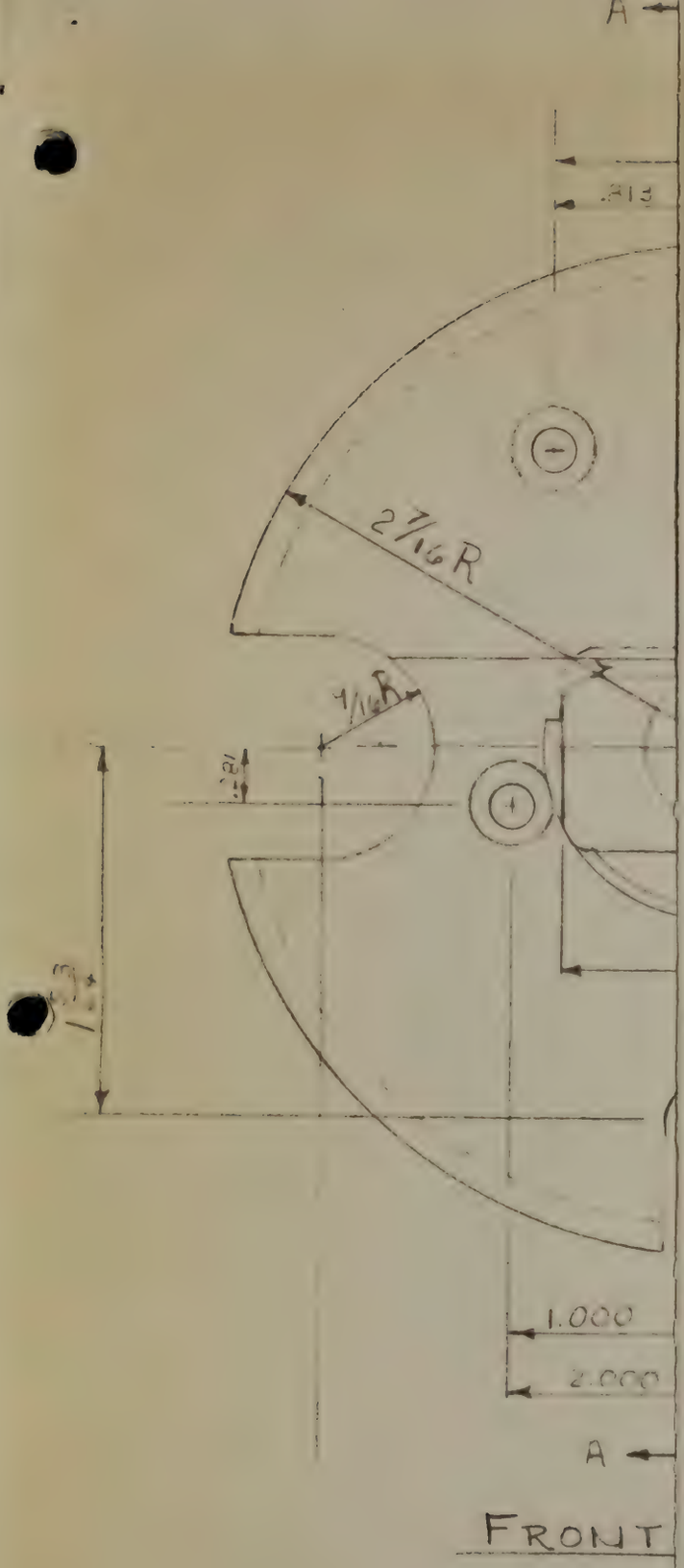
DRAFTSMAN	DATE	SCALE
W. F. M	10-4-51	1:1

DIV	SEC	PART # 18
2	1	DOUSER

DIMENSIONS IN INCHES TOLERANCES (unless otherwise specified)	
DECIMALS	±.005
FRACTIONS	±.015
ANGLES	± ½°

~~CAST~~

MATERIAL: COPPER
THERMAL CONDUCTIVITY AT LEAST 2.0 WATT-CM/CM²/C°



REVISIONS

NO.	E. C. N.	CHANGE	DATE
1			
2			
3			
4			

NBS DWG. Nº 3156-22

REF: NBS REPORT 1354

PIECE NO.	NOMENCLATURE	NO. REQ'D

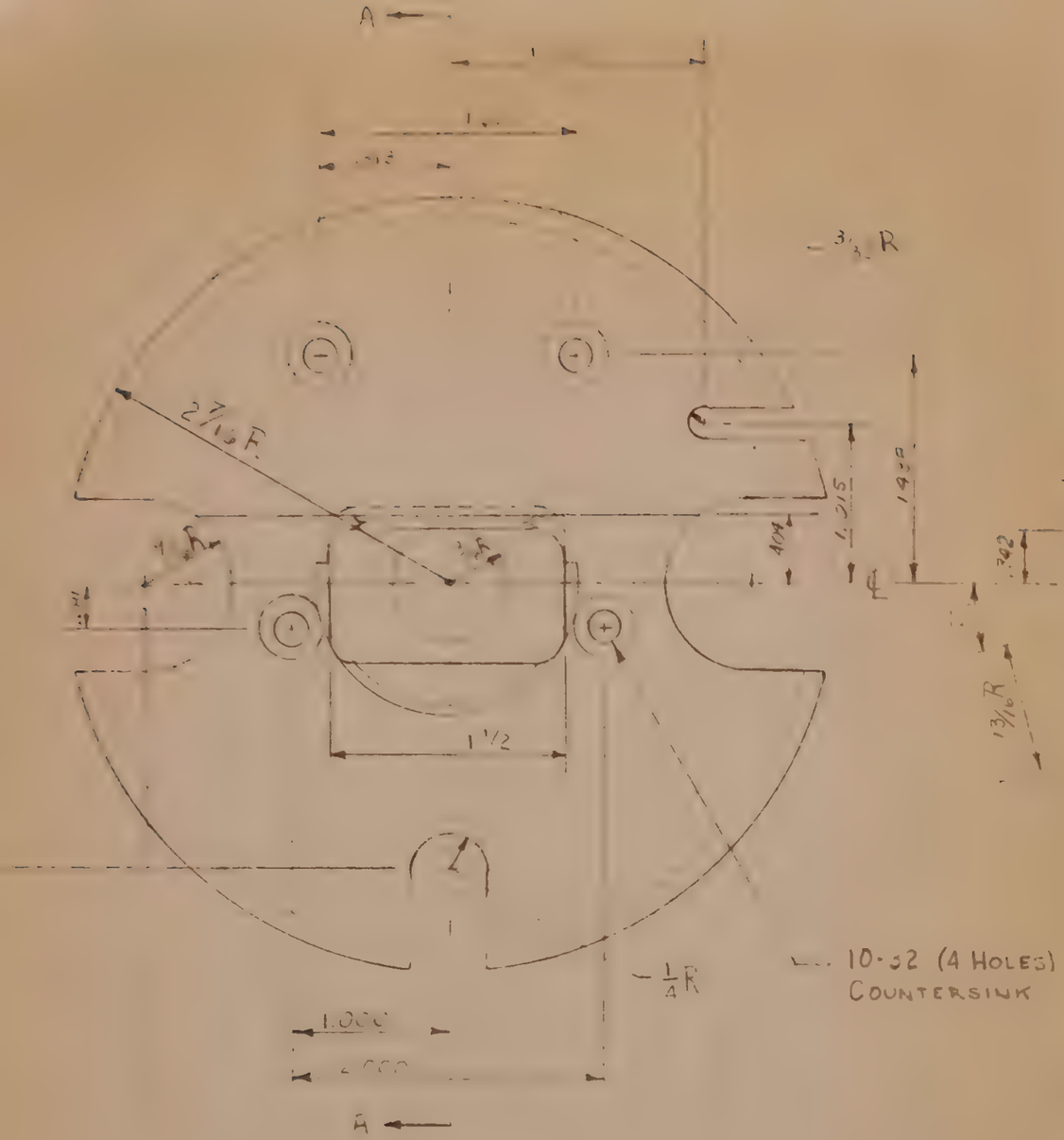
NATIONAL BUREAU OF STANDARDS
WASHINGTON 25, D. C.

OBTURATOR - PROBE

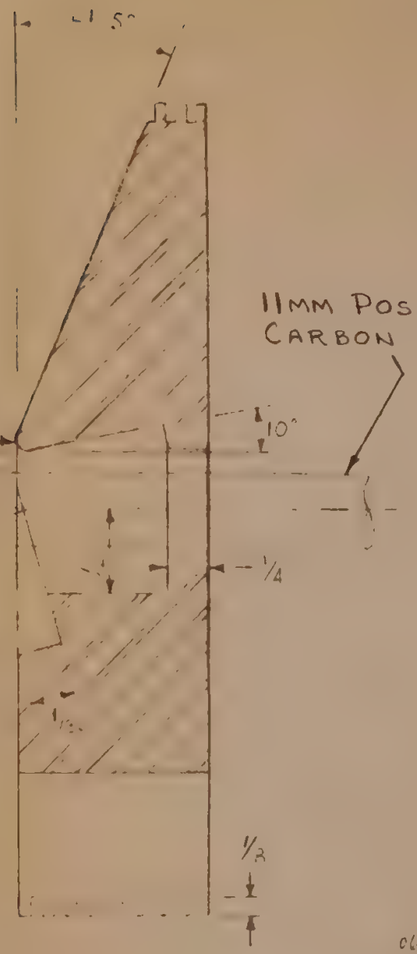
FOR— AVQ-2A SEARCHLIGHT

MODEL	TYPE	SCALE 1:1
DIMENSIONS IN INCHES (*Unless otherwise specified*)	DRAFTSMAN J.A.L.	CHECKER
TOLERANCES (*Unless otherwise specified*)	PROJECT ENGR.	PROJECT ENGR.
DECIMALS ±.005	SUBMITTED BY	
FRACTIONS ±.015		CHIEF, SEC.
ANGLES ±½°	EXAMINED BY	
DO NOT SCALE THIS PRINT		CHIEF ENGINEER
DIV. SEC. 2.1 / THIS PRINT ISSUED	APPROVED BY	CHIEF, DIV.

~~USAF~~ PART #22



FRONT VIEW



SECTION A-A

SIDE VIEW

MATERIAL: CAVITY-FREE, ELECTROLYTIC TOUGH PITCH COPPER (ANACONDA ALLOY #100) A- THERMAL CONDUCTIVITY AT LEAST 3.8 WATT-CM/CM²/C° (220 BTU-FT/FT²/HR/°F) AT 68°C

ORIGINAL DATE OF DRAWING FEB. 26'54.

REVISIONS

NO.	E. C. N.	CHANGE	DATE
1			
2			
3			
4			

NBS DWG. Nº 3156-22

REF: NBS REPORT 1354

PIECE NO.	NOMENCLATURE	NO. REQ'D

NATIONAL BUREAU OF STANDARDS
WASHINGTON 25, D. C.

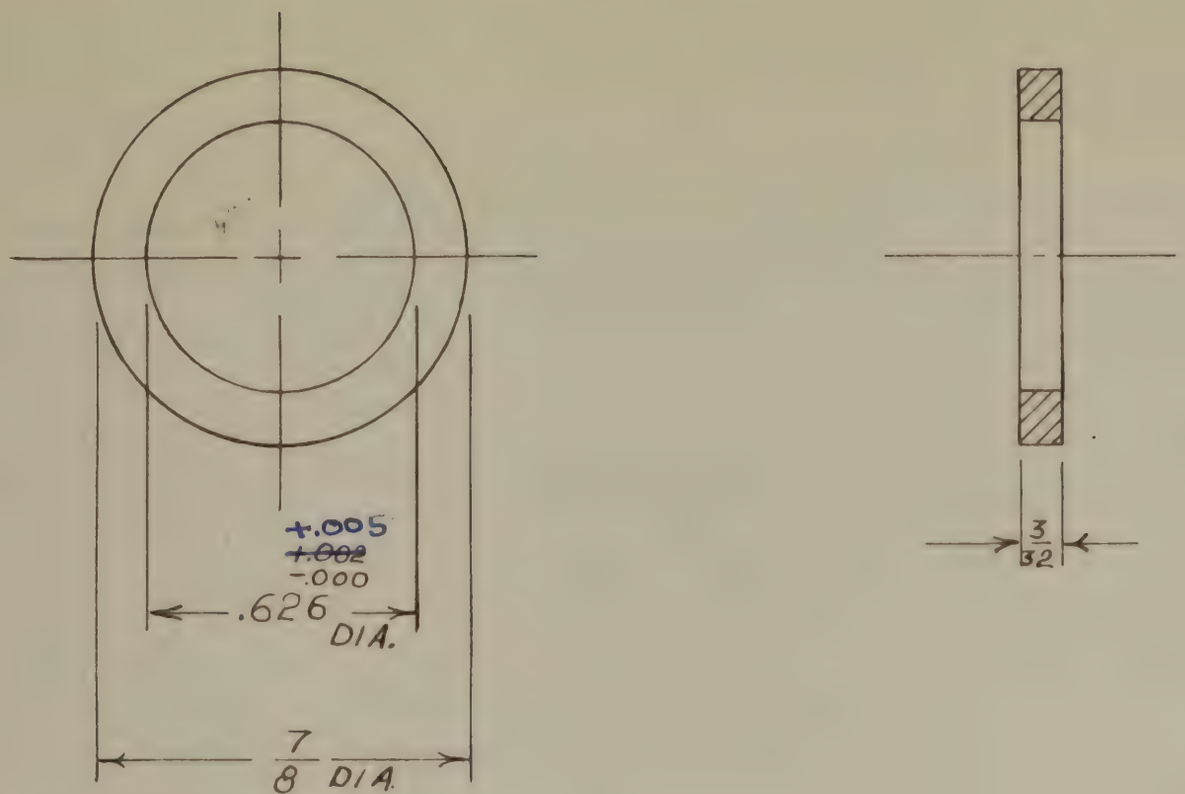
OBTURATOR - PROBE

FOR— AVQ-2A SEARCHLIGHT

MODEL	TYPE	SCALE 1:1
DIMENSIONS IN INCHES (Unless otherwise specified)	DRAFTSMAN J.A.L.	CHECKER
TOLERANCES (Unless otherwise specified)	PROJECT ENGR.	PROJECT ENGR.
DECIMALS ±.005	SUBMITTED BY	CHIEF, SEC.
FRACTIONS ±.015	EXAMINED BY	CHIEF ENGINEER
ANGLES ±½°	APPROVED BY	CHIEF, DIV.
DO NOT SCALE THIS PRINT		

DIV. SEC.	THIS PRINT ISSUED
2.1	

PART #22



NBS DWG # 3156-23

AVQ-2A SEARCHLIGHT
NBS MODIFICATION
REF: NBS REPORT 1354

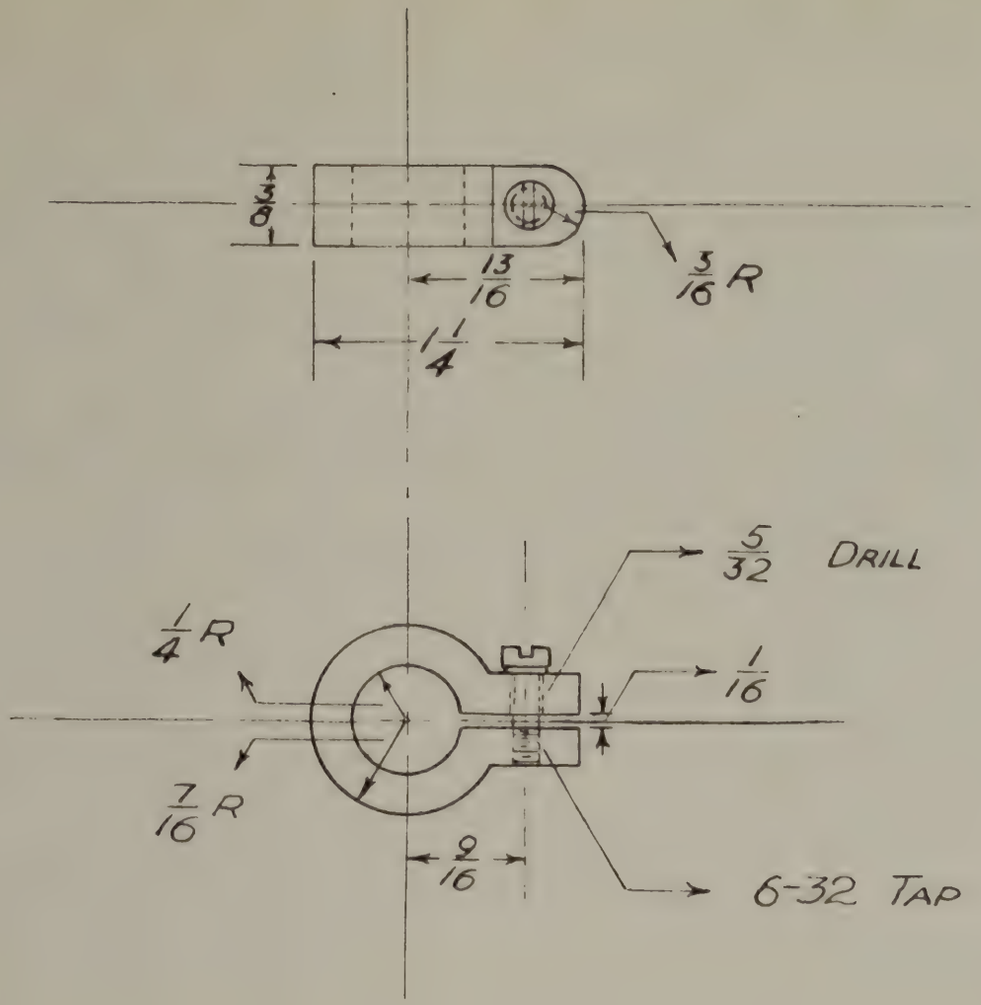
NATIONAL BUREAU OF STANDARDS
WASHINGTON 25. D. C.

DRAFTSMAN	DATE	SCALE
W.F.M.	8-4-52	2/1
DIV 2 - 1	SEC	WASHER # 23

DIMENSIONS IN INCHES
TOLERANCES
(UNLESS OTHERWISE SPECIFIED)

DECIMALS	± .005
FRACTIONS	± .015
ANGLES	± 1/2°

MATERIAL: TRANSITE LAVA, GRADE "A"



MATERIAL:

STAINLESS STEEL
AISI TYPE 302
INCLUDING SCREW & LOCK WASHER

NBS DWG. Nº 3156-24

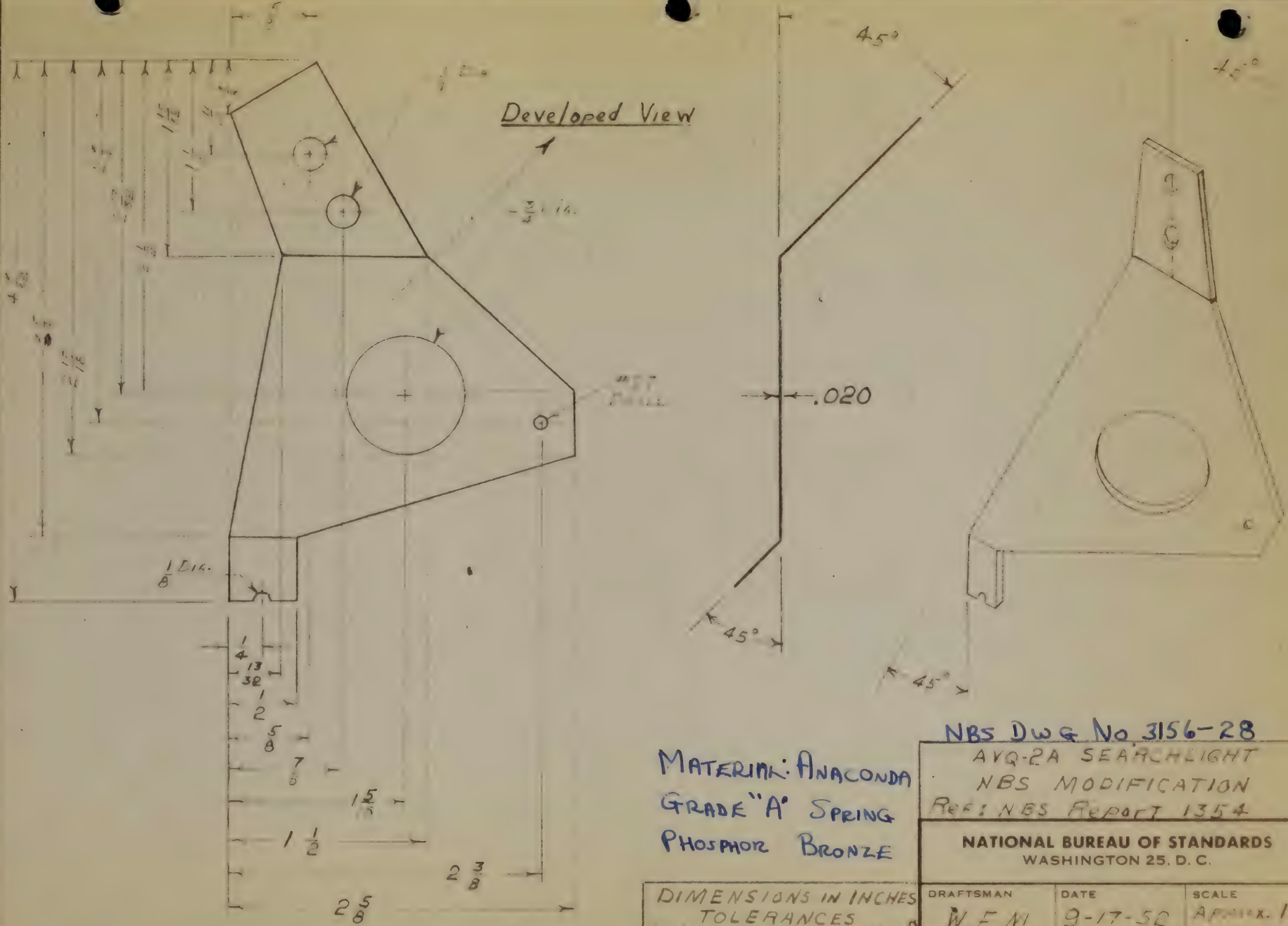
AVQ-2A SEARCHLIGHT
NBS MODIFICATION
REF: NBS REPORT 1354

NATIONAL BUREAU OF STANDARDS
WASHINGTON 25. D. C.

DRAFTSMAN	DATE	SCALE
W.Q.N.	10/15/51	1:1
DWG. 2	SEC. 1	CLAMP. PART #24 ~~CLAMP~~

DIMENSIONS IN INCHES
TOLERANCES
(unless otherwise specified)

DECIMALS	±.005
FRACTIONS	±.015
ANGLES	± ½°



NBS DWG No. 3156-28

MATERIAL: ANACONDA GRADE "A" SPRING PHOSPHOR BRONZE

AVQ-2A SEARCHLIGHT
NBS MODIFICATION
REF: NBS REPORT 1354

NATIONAL BUREAU OF STANDARDS
WASHINGTON 25. D. C.

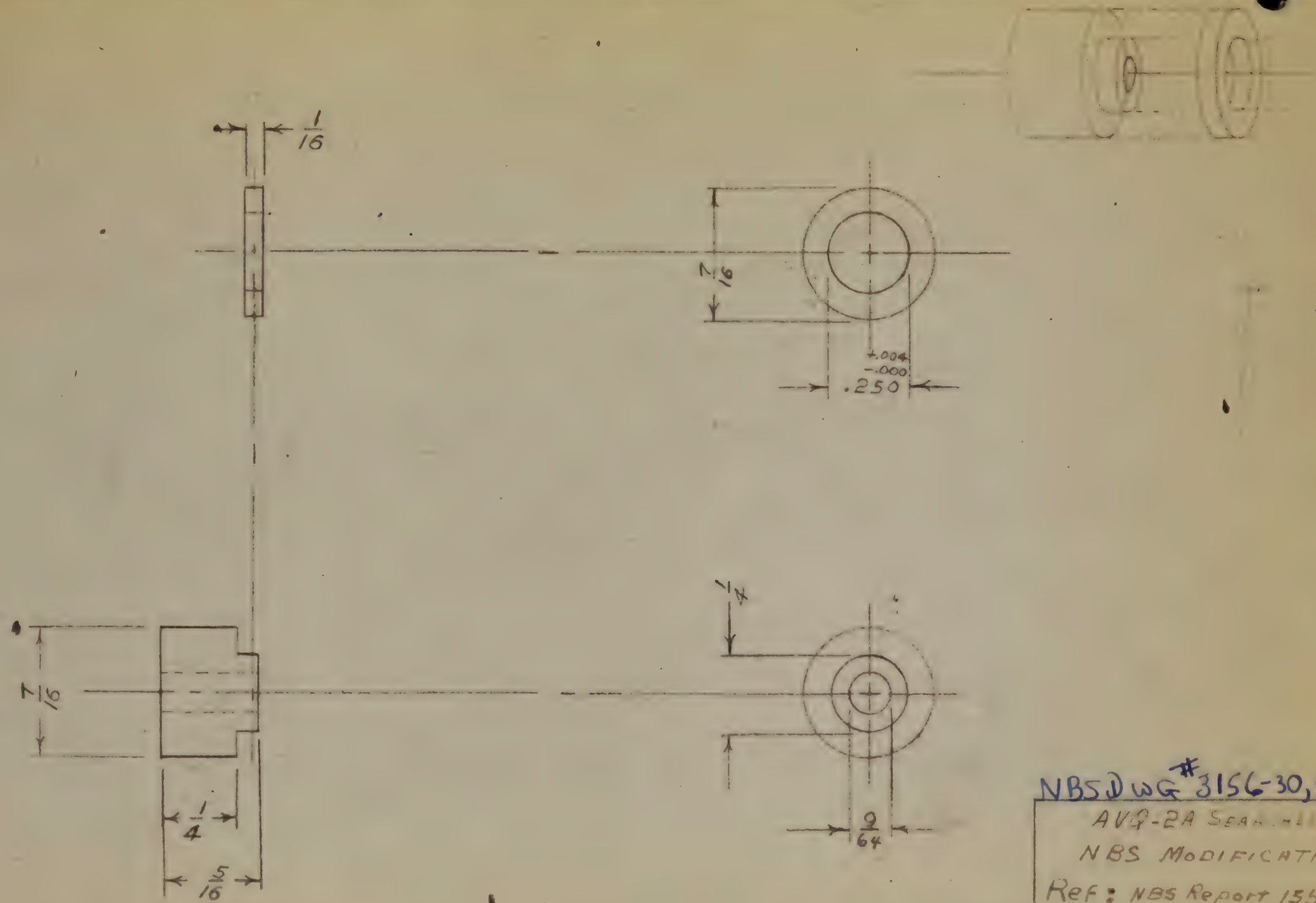
DRAFTSMAN	DATE	SCALE
W F M	9-17-52	APPROX. 1:1

DIV.	SEC.
2	1

BRUSH CONTACT ~~ASSY~~ #28

~~MATERIAL: Phosphor Bronze~~

DIMENSIONS IN INCHES
TOLERANCES
(Unless otherwise specified)
DECIMALS ± .005
FRACTIONS ± .015
ANGLES ± 1/2°



NBS DWG # 3156-30,31

AVG-2A SEAM WELDMENT

NBS MODIFICATION

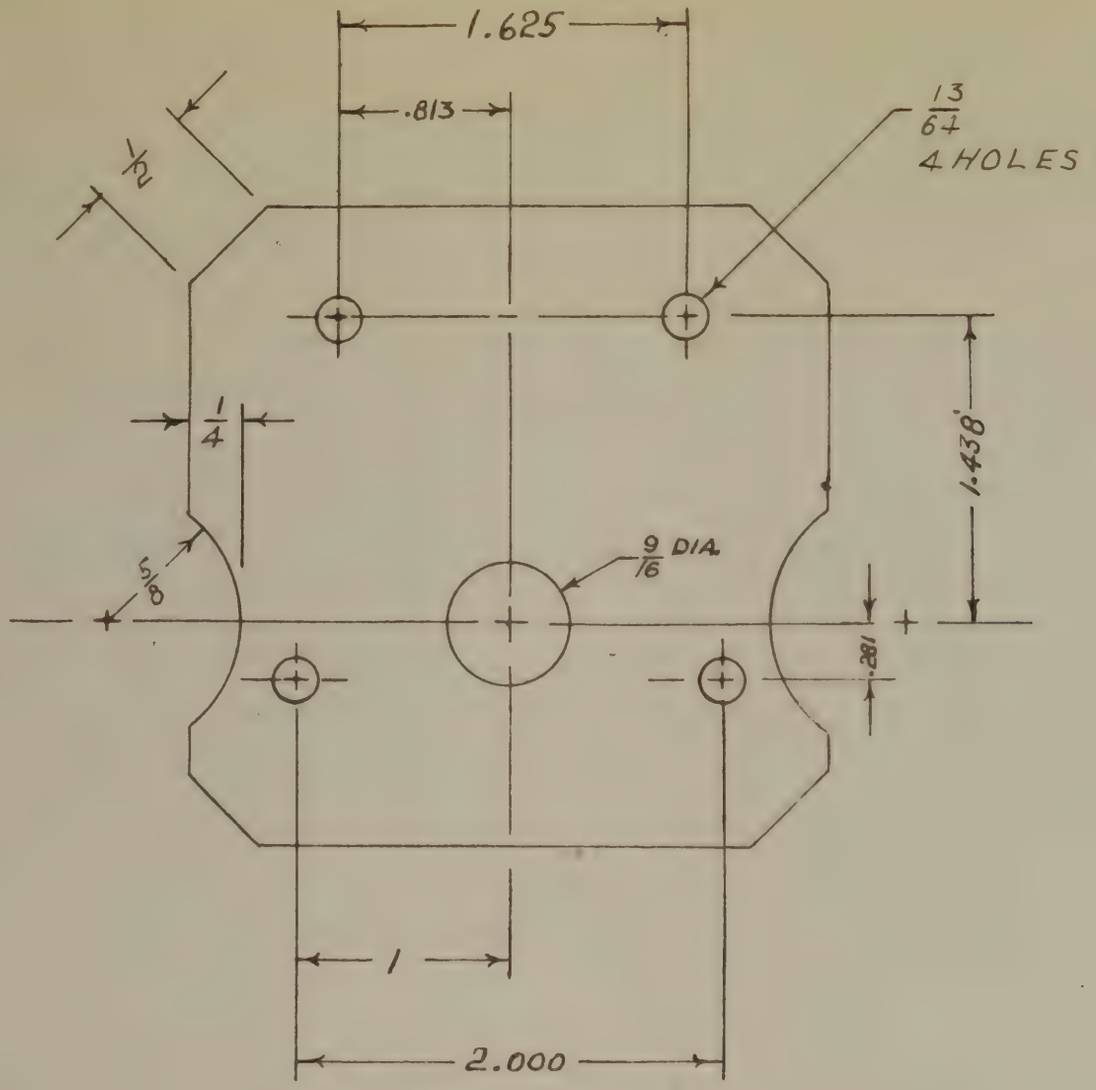
REF: NBS REPORT 1554

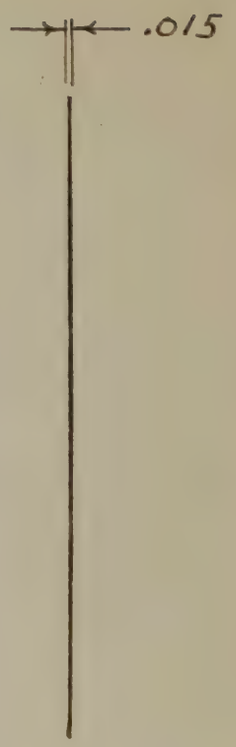
NATIONAL BUREAU OF STANDARDS
WASHINGTON 25, D. C.

DRAFTSMAN	DATE	SCALE
W.E.M.	1-10-52	2/1
DIV SEC	INSULATOR 30	31
2 — 1		

DIMENSIONS IN INCHES
TOLERANCES
(UNLESS OTHERWISE SPECIFIED)
DECIMALS - - - - ± .005
FRACTIONS - - - - ± 1/64"
ANGLES - - - - ± 1°

MATERIAL: COMPOSITION
TRADE NAME: TEXTOLITE
GOVT. SPEC. - N-17DS TY. FHE





NBS DWG No 3156-32

AVQ-2A SEARCHLIGHT
NBS MODIFICATION
REF: NBS REPORT 1354

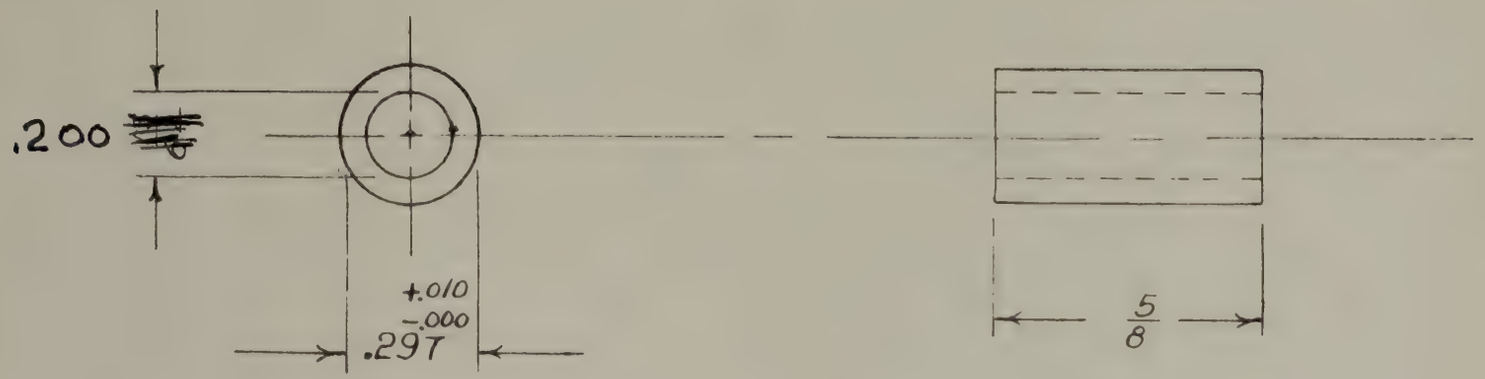
NATIONAL BUREAU OF STANDARDS
WASHINGTON 25. D. C.

DRAFTSMAN	DATE	SCALE
W. F. M	8-8-52	1/1
DIV SEC		
2 - 1	INSULATOR, 32	

DIMENSIONS IN INCHES
TOLERANCES
UNLESS OTHERWISE SPECIFIED

DECIMALS	±.005
FRACTIONS	±.015
ANGLES	± 1/2°

CLEAR
MATERIAL: PHLOGOPITE MICA



NBS DWG. Nº 3156-44

AVQ-2A SEARCHLIGHT
NBS MODIFICATION
REF: NBS REPORT 1354

NATIONAL BUREAU OF STANDARDS
WASHINGTON 25. D. C.

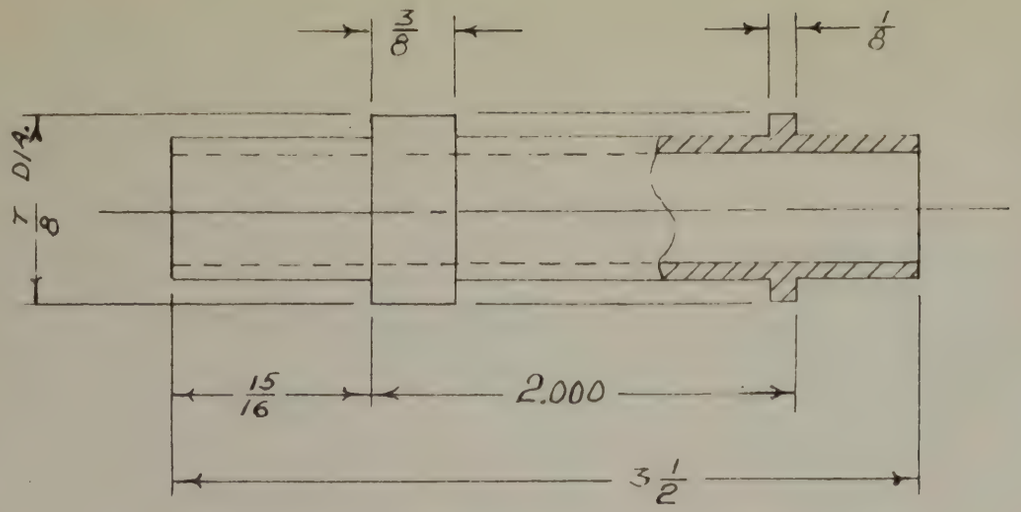
DRAFTSMAN	DATE	SCALE
W.F.M	8-5-52	2/1

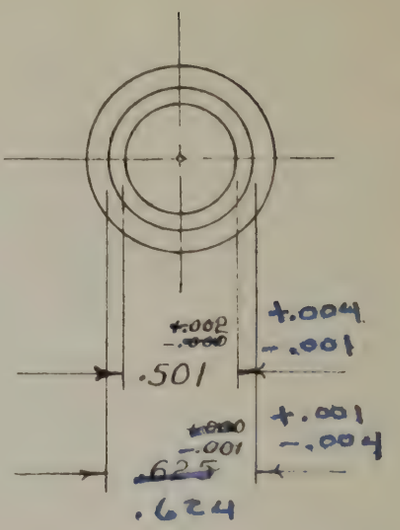
DIV	SEC	
2	1	BUSHING #44

DIMENSIONS IN INCHES
TOLERANCES
(UNLESS OTHERWISE SPECIFIED)

DECIMALS	±.005
FRACTIONS	±.015
ANGLES	± 1/2°

MATERIAL: ~~TRANSITE~~ LAVA-GRADE "A"





NBS DWG No 3156-46A

AVQ-2A SEARCHLIGHT
NBS MODIFICATION
REF: NBS REPORT 1354

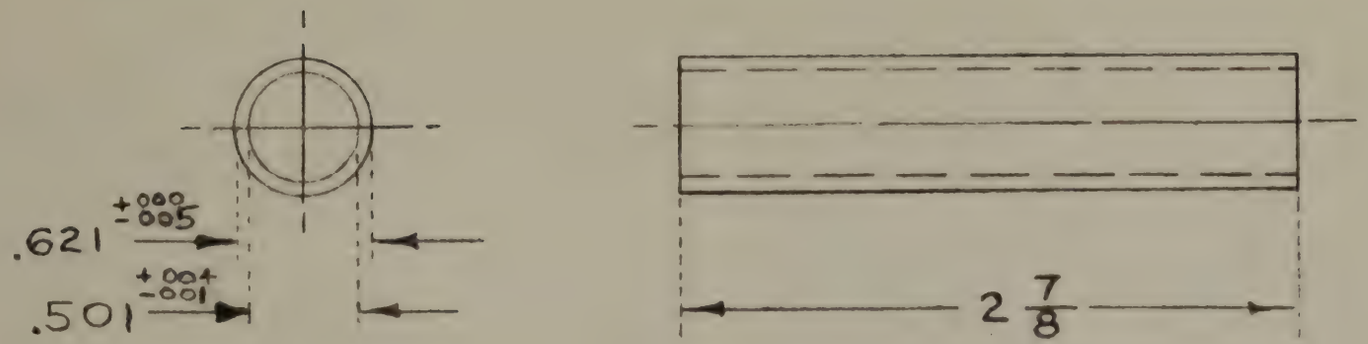
NATIONAL BUREAU OF STANDARDS
WASHINGTON 25. D. C.

DRAFTSMAN	DATE	SCALE
W.F.M.	8-28-52	1/1
DIV SEC.	SPACER & INSULATOR	
2 - 1	POSITIVE DRIVE, 46A	

DIMENSIONS IN INCHES
TOLERANCES
(UNLESS OTHERWISE SPECIFIED)

DECIMALS	±.005
FRACTIONS	±.015
ANGLES	± 1/2°

MATERIAL ~~COMPOSITION~~ LAVA, GRADE "A"
~~GOVT. SPEC. N-1206 TYPE BE~~
~~TRADE NAME: TEXTOLITE~~



NBS Dwg No 3156-46B

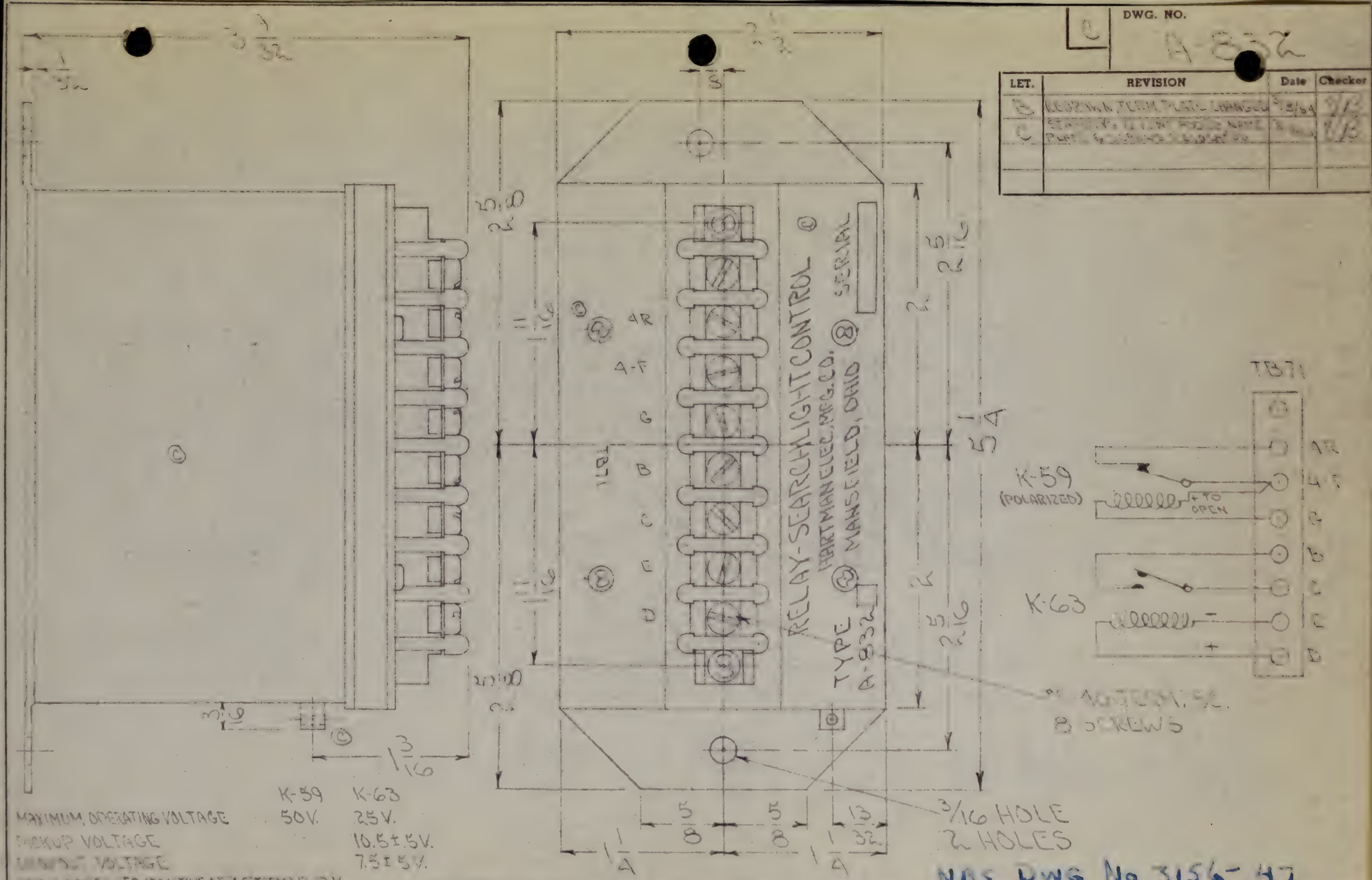
AVQ-2A SEARCHLIGHT
NBS MODIFICATION
REF: NBS REPORT 1354

NATIONAL BUREAU OF STANDARDS
WASHINGTON 25, D. C.

DRAFTSMAN	DATE	SCALE
JWL	2-23-54	1/1
DIV. 2 SEC. 1	INSULATOR, NEG. ASSEMBLY - #46B	

DIMENSIONS IN INCHES
TOLERANCES
(unless otherwise specified)
DECIMALS ±.005
FRACTIONS ±.015
ANGLES ± 1/2°

MATERIAL:
GRADE "A" LAVA



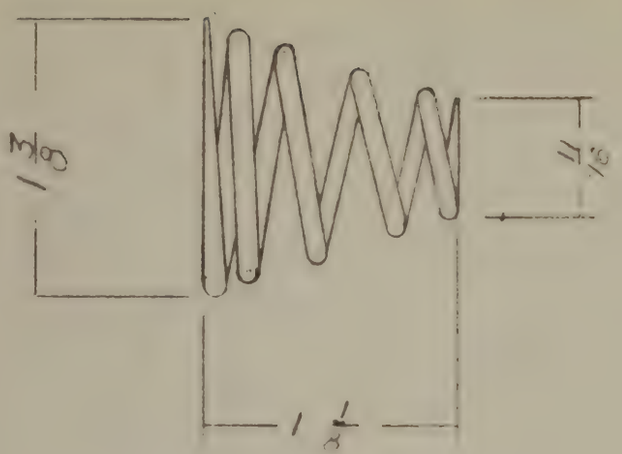
LET.	REVISION	Date	Checker
B	LEGEND & TERM. PLATE CHANGED	3/59	
C	[illegible]	[illegible]	

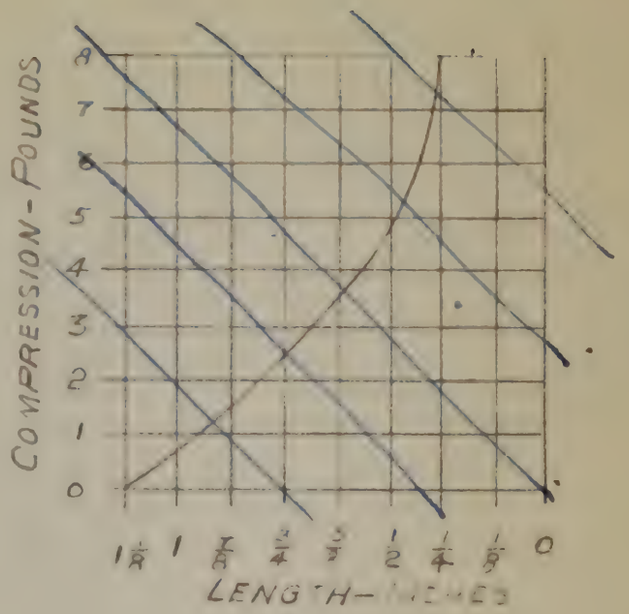
DWG. NO. A-832

	K-59	K-63
MAXIMUM OPERATING VOLTAGE	50V.	25V.
PICK-UP VOLTAGE		10.5±.5V.
DROP-OUT VOLTAGE		7.5±.5V.
MAIN CONTACTS (POSITIVE AT 4 & 7 TERM.)		12.5V.
AUXILIARY CONTACTS (POSITIVE AT 4 & 7 TERM.)		6-7V.
RATED LOAD		
MOTOR	3.5 AMP.	3.5 AMP.
COIL RESISTANCE	277 Ω.	277 Ω.
MAXIMUM OPERATING PERIOD	56V.-3 MIN. ON 5 MIN. OFF	CONT.
	28V.-CONT.	
MINIMUM PICK-UP VOLTAGE	28V.	10 V.

NBS DWG No 3156-47

THE HARTMAN ELECTRICAL MANUFACTURING COMPANY - - - MANSFIELD, OHIO								
	1-1	Unless otherwise specified: Fractions .010 Decimals .003	B.S.	3-8-59	1/2		A832-2A	
SPECIAL TREATMENT	SCALE	TOLERANCES	DRAWN BY	DATE	CHECKER	NO REQ'D	USED ON	NEXT ASSEM.
	NAME					DWG. NO.		





NBS Dwg No. 3156-56

AVQ-2A SEARCHLIGHT
NBS MODIFICATION
Ref: NBS REPORT 1354

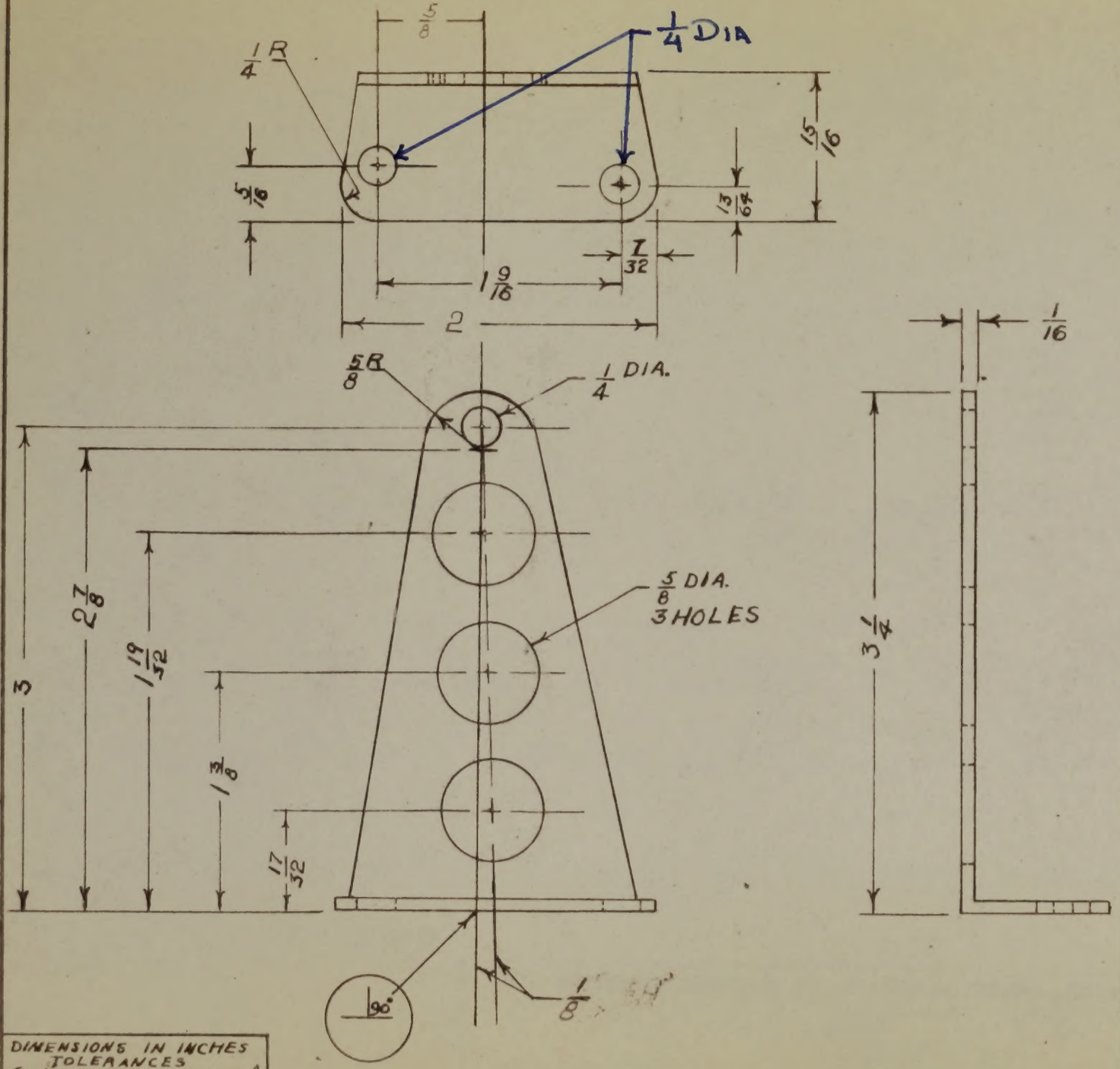
NATIONAL BUREAU OF STANDARDS
WASHINGTON 25, D. C.

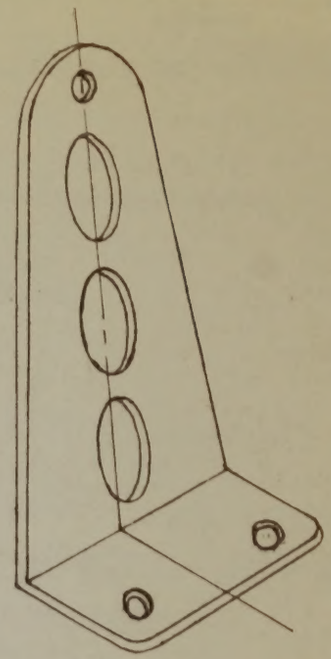
DRAFTSMAN	DATE	SCALE
W. F. A.	8-23-52	APPROX. 1/1
DIV SEC	PART	
2 - 1	DOUSER SPRING #56	

DIMENSIONS IN INCHES
TOLERANCES
(unless otherwise specified)

DECIMALS	±.005
FRACTIONS	±.015
ANGLES	± 1/2°

.059 CADMIUM
PLATED STEEL
MATERIAL: MUSIC WIRE





NBS Dwg. # 3156-65

AVQ-2A SEARCHLIGHT
NBS MODIFICATION
REF: NBS REPORT 1354

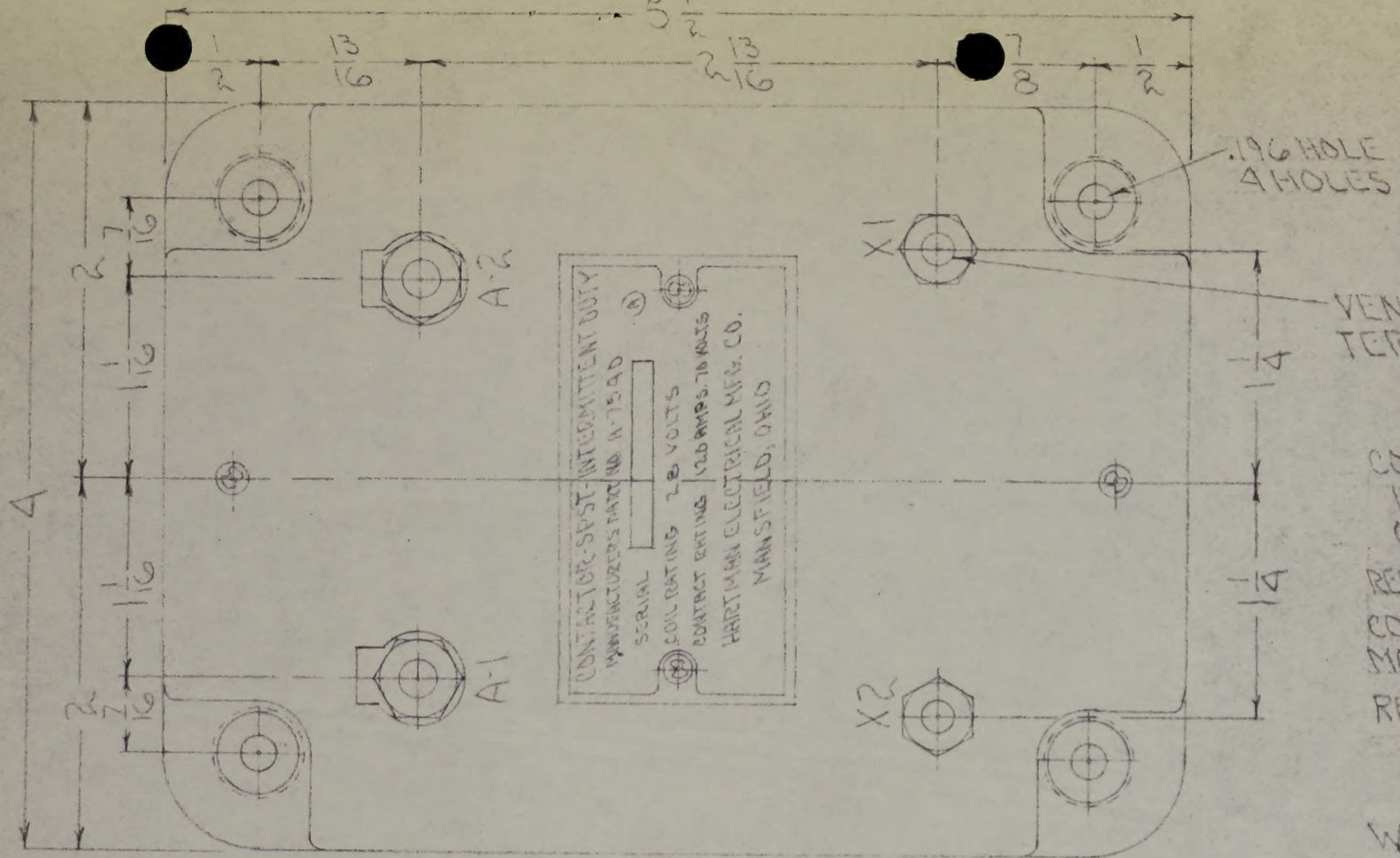
NATIONAL BUREAU OF STANDARDS
WASHINGTON 25, D. C.

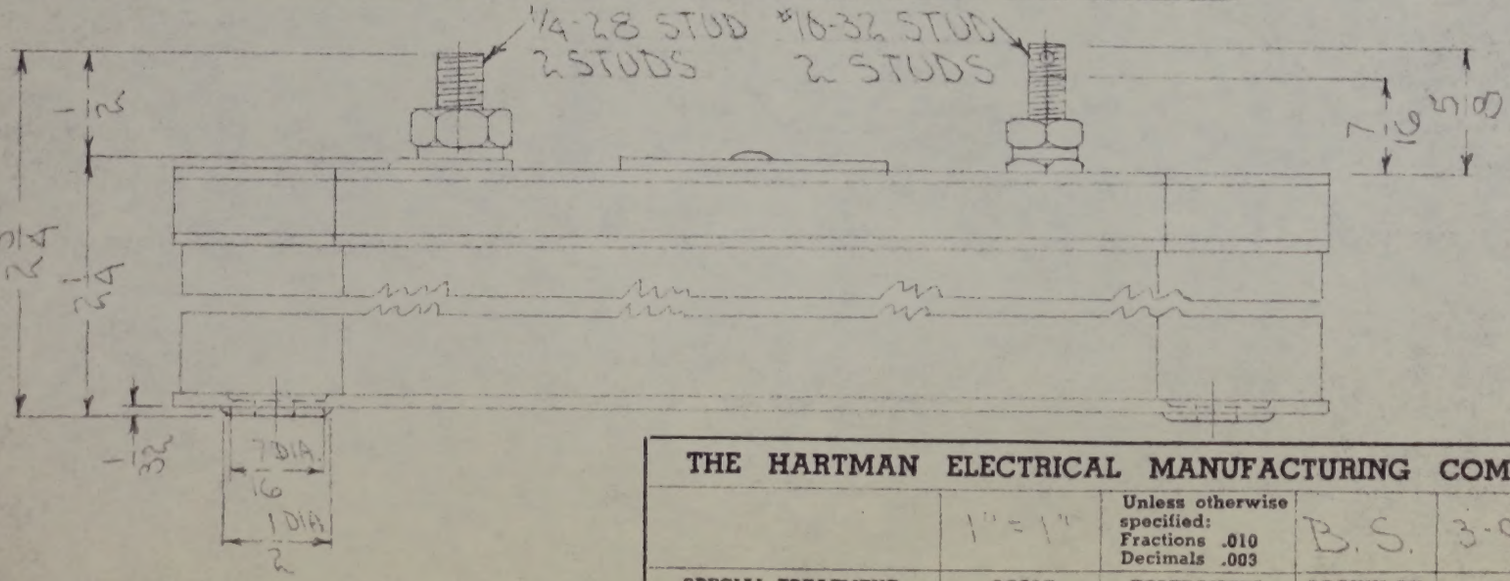
DRAFTSMAN	DATE	SCALE
W.F.M	8-7-52	1/1

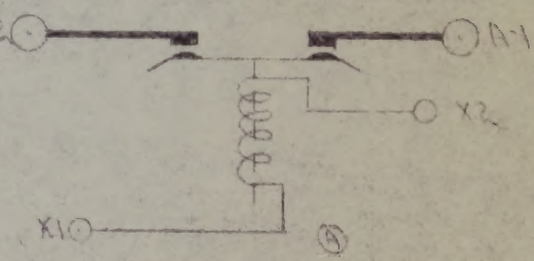
DIV.	SEC.	PART No.
2	1	BRACE 65

DIMENSIONS IN INCHES TOLERANCES (UNLESS OTHERWISE SPECIFIED)	
DECIMALS	±.005
FRACTIONS	±.015
ANGLES	±. 1/2°

MATERIAL: BRASS, HALF HARD







LET.	REVISION	Date	Checker
A	WIRING DIAGRAM CHANGED STAMPING MOVED TO NAME PLATE	3/16/54	V.B.

DWG. NO. A-75AD

CONTACT RATING
INTERMITTENT DUTY - 1 MIN. OUT OF 5 MIN. 120 AMP. 70 VOLTS

RELAY COIL TO BE OPERATED FROM 28 V. D.C.

COIL CURRENT 1.25 AMP.
MAX. AT 28 V. D.C. AT 77° F.

RELAY TO CONFORM TO SPEC.
MIL-R-6742

WEIGHT 2 LBS. 10 OZ. MAX.

NBS Dwg No 3156-K64

THE HARTMAN ELECTRICAL MANUFACTURING COMPANY - - - MANSFIELD, OHIO

SPECIAL TREATMENT	SCALE	TOLERANCES	DRAWN BY	DATE	CHECKER	NO REQ'D	USED ON	NEXT ASSEM.
	1" = 1"	Unless otherwise specified: Fractions .010 Decimals .003	B. S.	3-9-54	V.B.			

NAME CONTACTOR-INTERMITTENT DUTY

DWG. NO.